

The effect of the buccal corridor and tooth display on smile attractiveness

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Aims: The aim of the present study was to evaluate the lay perception of the effect of the buccal corridor and amount of tooth-gingival display on the attractiveness of a smile in different facial types.

Materials and methods: Using Adobe Photoshop CS3 software, frontal facial images of two smiling Iranian female subjects (one short-faced and one long-faced) were altered to create different magnitudes of buccal corridor display (5, 10, 15, 20 and 25%) and tooth-gingival display (2 mm central incisor show, 6 mm central incisor show, total central incisor show, total tooth show with 2 mm gingival show and total tooth show with 4 mm gingival show). Sixty Iranians (30 males and 30 females) rated the attractiveness of the pictures on a 1–5 point scale.

Results: Narrower smiles were preferred in long-faced subjects compared with short-faced subjects. Minimal tooth show was more attractive than excessive gingival display in short-faced subjects. There were no gender specific, statistically significant differences found in the ratings given by the lay assessors.

Conclusions: Harmonious geometry of the smile and face in both the vertical and transverse dimensions influences smile attractiveness and this should be considered in orthodontic treatment planning.

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Introduction

Aesthetics is increasingly becoming the main reason for patients seeking dental care, and appearance is an important aspect of orthodontic diagnosis and treatment planning. Smile aesthetics has become an important goal for orthodontists and their patients¹⁻³ and a major criterion by which orthodontic success is judged.⁴ Moreover, social acceptance is affected by smile aesthetics, and a patient's personality, self-confidence and self-esteem are highly influenced by the smile and facial attractiveness.^{5,6} Smile aesthetics is affected by its component smile arc and the amount of tooth-gingival show. Excessive gingival display, or a 'gummy' smile, has been reported to be less attractive in comparison with minimal gingival display.⁷⁻⁹ The

buccal corridor, defined by Frush and Fisher¹⁰ as the space between the buccal surfaces of the posterior teeth and the corners of the mouth on smiling, also influences oral attractiveness. It has been reported that minimal buccal corridor show is more attractive.^{11,12} However, additional studies have evaluated the effect of smile features such as buccal corridor, gingival show and midline deviation on smile attractiveness with equivocal results which might be more reliable if related facial types were considered.¹³

Therefore, the present study sought to evaluate and compare the effect of gingival display and buccal corridor dimension on smile attractiveness in long- and short-faced subjects.

Materials and methods

Frontal facial smiling photographs of two Iranian women (one long- and one short-faced subject) with co-incident dental midlines and aligned anterior teeth were selected from the archives of the Department of Orthodontics of Tehran University of Medical Sciences. The determination of the facial type was based on data obtained from lateral cephalometric analysis including the Frankfort-mandibular plane angle (FMA), the Jarabak index and the proportion of the middle facial one-third to lower facial one-third (FMA = 15, Jarabak index = 75 and g-sn/sn-me = 55/45 for the short-faced subject and FMA = 35, Jarabak index = 55 and g-sn/sn-me = 45/55 for the long-faced subject). Photographs of each subject were obtained from the clinical files and modified using Adobe Photoshop CS3 software (Adobe Systems, CA, USA) to mask the eyes and make the desired changes for evaluation of the buccal corridor and tooth display.

Five images for each subject with varying buccal corridor widths of 5, 10, 15, 20 and 25% were produced. Intercanine width was constant in all of the images. The five photographs were organised in order of increasing buccal corridor width and printed

on a large sheet of paper. Each figure was 18 × 24 cm (Figures 1 and 2).

In order to assess tooth show, five figures (2 mm incisor show, 6 mm incisor show, complete incisor show, complete incisor show with 2 mm gingival display and complete incisor show with 4 mm gingival display) were produced for each subject. The images were arranged in order of decreasing tooth show and similarly printed (Figures 3 and 4).

A pilot study inviting participation of 10 lay people (five women and five men) was performed to assess the reliability of the study.

Sixty Iranian lay people (30 males and 30 females) with a mean age of 25.5 ± 3.2 years and no history of dental, cosmetic or plastic surgery training or orthodontic treatment evaluated the images. All were asked to rate the buccal corridor and tooth display figures on a 1–5 point scale; the most attractive image was scored 5 and the least was scored 1.

Statistical analysis

In order to evaluate the reliability, an interclass correlation (ICC) test and weighted kappa test were



Figure 1. Sequence of the five images illustrating different levels of buccal corridor in the long-faced patient, incrementally from 5% to 25%.



Figure 2. Sequence of the five images illustrating different levels of buccal corridor in the short-faced patient, incrementally from 5% to 25%.

applied. Repeated measures ANOVA evaluated the buccal corridor width and tooth show in each facial type and between the two facial types. Tukey's test was used in an individual comparison of the figures and the Chi square test was used to compare genders. *P* values less than 0.05 were considered statistically significant.

Results

There was no statistically significant difference between male and female judges in the evaluation of tooth display and buccal corridor width in the long-faced and short-faced subjects.

Buccal corridor

The present results revealed that, in short-faced subjects, a buccal corridor width of 5% was the most preferred and 25% was the least attractive. There was a significant difference between all groups except between the 10% and 15% pairs.

A comparison of the ratings for the long-faced subject showed that a 15% buccal corridor show was the most

attractive, followed by 10, 20, 5 and 25%. Detailed data analysis regarding buccal corridor width is shown in Table I.

Tooth display

The smile revealing the central incisors in full was considered the most attractive in both long- and short-faced subjects.

A 4 mm gingival show in the short-faced subject was deemed the least attractive; while a 2 mm central incisor display was the worst in the long-faced subject.

Table II shows the scoring results related to tooth display for the long-faced and short-faced subjects.

A comparison of buccal corridor width and tooth display in the two facial types is illustrated in Figures 5 and 6, respectively.

Discussion

Standards of beauty are affected by factors related to age, gender, culture and socio-economic status.^{14,15} Ioi et al. found statistically significant differences in buccal



Figure 3. Sequence of the five images illustrating different levels of tooth show in the long-faced patient, from 4 mm gingival show to 2 mm central incisor show.



Figure 4. Sequence of the five images illustrating different levels of tooth show in the short-faced patient, from 4 mm gingival show to 2 mm central incisor show.

Table I. Mean scores and standard deviations for buccal corridor given by all raters.

Facial type	Buccal corridor show	Mean score	Standard deviation
Short face	5%	4.22	0.885
	10%	3.33	1.374
	15%	3.60	0.848
	20%	2.48	0.911
	25%	1.37	0.991
Long face	5%	2.27	1.376
	10%	3.73	1.071
	15%	3.75	1.129
	20%	3.33	1.084
	25%	1.93	1.326

Table II. Mean scores and standard deviations for tooth show given by all raters.

Facial type	Tooth show	Mean	Standard deviation
Short face	2 mm	1.73	0.821
	6 mm	3.45	0.832
	all length of central incisor	4.70	0.591
	2 mm gingiva	3.55	0.852
	4 mm gingiva	1.57	0.745
Long face	2 mm	1.12	0.372
	6 mm	2.82	1.081
	all length of central incisor	4.50	0.624
	2 mm gingiva	3.97	0.863
	4 mm gingiva	2.60	0.827

corridor assessment between Koreans and Japanese.¹¹ It was noted that standards of beauty varied between populations based on social and cultural views.

Since the aim of the present study was to evaluate smile characteristics in long-faced and short-faced subjects, full-face photographs were used to enable the judges to assess facial form as well as the smile.

Most studies that have assessed smile aesthetics have been based on information collected from photographs or images only of the mouth and in patients with a normal face pattern. Hence there are missing smile data related to other facial types.

In addition, although several studies have investigated smile characteristics, there is still controversy regarding the various effects of smile features, especially the buccal corridor on smile attractiveness. It has been asserted that more attractive smiles have narrower buccal corridors; however, other studies have noted

that the buccal corridor does not play a significant role in smile aesthetics.^{11,12,16,17}

Little research has evaluated smile characteristics in different facial forms. Zange et al. showed that Brazilians preferred narrower buccal corridors in both long- and short-faced subjects, which is contrary to the present results.¹⁸ A possible reason for this difference might arise from the varying views regarding beauty in the Brazilian population. Furthermore, the present study used a 1–5 point scale for evaluation, which was more user-friendly than the visual analogue scale (VAS) used by Zange et al. Although these scales are similar in validity and reliability, the 1–5 point scale was preferred because of its simplicity and ready interpretation.^{19–21}

The present results revealed that the effects of buccal corridor width and tooth display on smile aesthetics are strongly related to facial height.

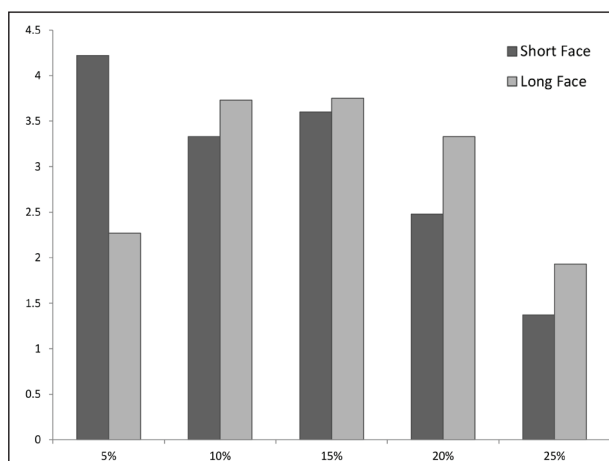


Figure 5. Comparative illustration of the mean scores of buccal corridor for long-faced and short-faced subjects.

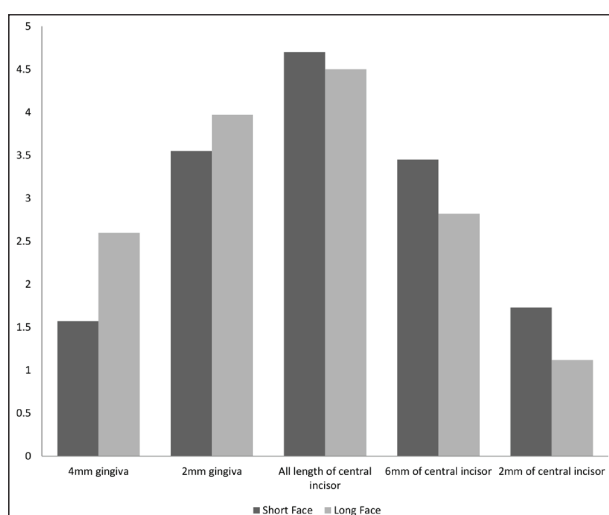


Figure 6. Comparative illustration of the mean scores of tooth display for long-faced and short-faced subjects.

It was considered that an attractive smile should be harmonious with the geometry of face in the vertical and transverse dimensions. Therefore, in short-faced subjects presenting with broader faces, a wider smile with minimal buccal corridor show was preferred. In contrast, a smile with excessive vertical dimension characterised by excessive gingival show was the most unpleasant in short-faced subjects. In long-faced subjects, a narrower smile was considered more desirable and a smile with short vertical dimension and minimal gingival show was the least desirable.

The results of the present study revealed that wider buccal corridors and larger levels of gingival display are less unattractive in long-faced patients. This should be borne in mind when making treatment planning decisions for these patients.

Conclusion

The present study suggests that the influence of buccal corridor width and anterior tooth display on smile attractiveness is highly dependent on the patient's facial type. A minimum and a moderate buccal corridor are the most accepted for short- and long-faced subjects, respectively. In short-faced subjects, excessive gingival display was less appealing than minimal tooth show but increased gingival display was more accepted in long-faced subjects.

Although the present study focused on buccal corridor width and anterior tooth display, deviations in other smile characteristics including the midline, smile arc and transverse cant may differently affect attractiveness in various facial types. These are likely topics for future studies.

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